

Claims

We claim:

1. A process for forming a nonwoven web comprising
 - a. providing a source of fibers;
 - b. subjecting said fibers to an electrostatic charge by passing said fibers through an electrostatic unit having a first side and a second side opposed to each other, wherein the electrostatic unit has an array of protrusions on both the first side and the second side of the electrostatic unit;
 - c. collecting said fibers on a forming surface to form a nonwoven web.
2. The process of claim 1, wherein the electrostatic charge is generated between the array of protrusions of the first side and the array of protrusions of the second side and the array of protrusions of the first side and the array of protrusions of the second side are opposed to one another one.
3. The process of claim 2, wherein the array of protrusions of the first side and the array of protrusions of the second side each comprise an array of pins.
4. The process of claim 3, wherein the array of pins of the first side and the array of pins of the second side are recessed within a cavity of an insulating material such that the pins essentially do not extend beyond the insulating material.
5. The process of claim 2, wherein the fibers are provided by a melt spinning process and the fibers are substantially continuous fibers.
6. The process of claim 2, wherein continuous fibers are subjected to pneumatic draw force in a fiber draw unit prior to being subjected to said electrostatic charge.
7. The process of claim 2, further comprising deflecting the fibers with a deflecting device prior collecting the fibers on the forming surface.
8. The process of claim 1, wherein the fibers are substantially continuous fibers provided by melt spinning and are subjected to pneumatic draw force in a fiber draw unit prior to being subjected to said electrostatic charge, the array of protrusions of the first

side and the array of protrusions of the second side each comprise an array of pins, the electrostatic charge is generated between the array of pins of the first side and the array of pins of the second side and the array of pins of the first side and the array of pins of the second side are opposed to one another one.

9. The process of claim 8, wherein the array of pins of the first side and the array of pins of the second side are recessed within a cavity of an insulating material such that the pins essentially do not extend beyond the insulating material.

10. The process of claim 9, further comprising deflecting the fibers with a deflecting device prior collecting the fibers on the forming surface.

11. The process of claim 1, wherein the electrostatic charge is generated by a series of at least two separate electrostatic charge fields along a length of the electrostatic unit, each charge field having an array of protrusions on at least one of the first side or the second side of the electrostatic unit.

12. The process of claim 11, wherein the array of protrusions of the first side and the array of protrusions of the second side each comprise an array of pins.

13. The process of claim 12, wherein a first charge field is generated by the array of pins on the first side of the electrostatic unit and a second charge field is generated by the array of pins on the second side of the electrostatic unit.

14. The process of claim 13, wherein a first electrostatic charge field is generated between a first array of pins on the first side of the electrostatic unit and first array of pins on the second side of the electrostatic unit and a second electrostatic charge field is generated between a second array of pins on the first side of the electrostatic unit and a second array of pins on the second side of the electrostatic unit.

15. The process of claim 14, wherein the first electrostatic field is generated from a potential on the first side of the electrostatic unit and the second electrostatic field is generated from a potential on second side of the electrostatic unit.

16. The process of claim 11, wherein the array of pins of the first side and the array of pins of the second side are recessed within a cavity of an insulating material such that the pins essentially do not extend beyond the insulating material.

17. The process of claim 2, wherein an electrical potential is alternated from the protrusions on the first side to the protrusions on the second side and back to the protrusions on the first side.

18. An apparatus for forming a nonwoven web comprising
a. a source of fibers;
b. a device for applying an electrostatic charge to said fibers, said device comprising a first side and a second side opposed to each other, wherein the device has an array of protrusions on the first side and the second side of the electrostatic unit;
c. a forming surface for collecting said fibers.

19. The apparatus of claim 18, wherein the array of protrusions on the first and second sides comprise an array of pins.

20. The apparatus of claim 19, the array of pins of the first side and the array of pins of the second side are recessed within a cavity of an insulating material such that the pins essentially do not extend beyond the insulating material.

21. The apparatus of claim 19, wherein the source of fibers comprises a spinplate which is feed with one or more polymeric materials.

22. The apparatus of claim 21, further comprising a fiber draw unit, wherein the fiber draw unit is located below the source of fibers and the device for applying an electrostatic charge.

23. The apparatus of claim 22, further comprising a deflector located below the device for applying an electrostatic charge and above the forming surface.

24. The apparatus of claim 19, wherein the device for applying an electrostatic charge comprises a series of at least two separate electrostatic charge fields sections along a length of the electrostatic unit, each charge field section having an array of pins on at least one of the first side or the second side of the device.

25. The apparatus of claim 24, wherein an electrostatic charge field is generated between a first array of pins on the first side of the electrostatic unit and first array of pins on the second side of the electrostatic unit arranged such that the pins of the first side and the pins of the second side are opposed to each other and a second electrostatic charge field is generated between a second array of pins on the first side of the electrostatic unit and a second array of pins on the second side of the electrostatic unit arranged such that the pins of the first side and the pins of the second side are opposed to each other.

26. The nonwoven web produced by the process of claim 1.

27. The nonwoven web produced by the process of claim 8.